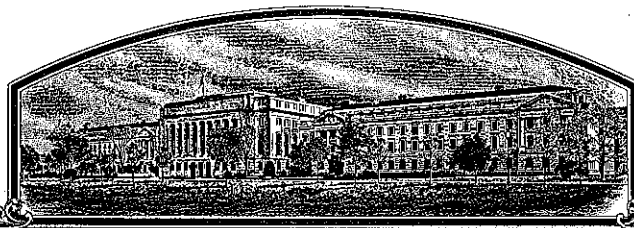


No.

9600360



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

The Curators of the University of Missouri

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED, PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE SEED. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'Ernie'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this thirty-first day of January, in the year of our Lord two thousand.

Attest:

Ann Marie Threlkeld

Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

Samuel Hildner

Secretary of Agriculture

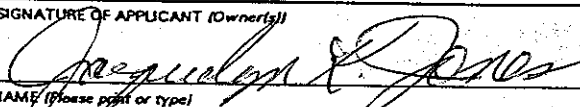
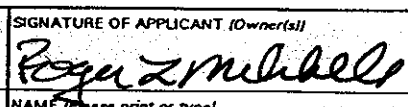
U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

## APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
The Curators of the University of Missouri		MO 12256	Ernie
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)		5. TELEPHONE (include area code)	FOR OFFICIAL USE ONLY PVPO NUMBER 9600360
University of Missouri 321 University Hall Columbia, MO 65211		573-882-3211	
7. GENUS AND SPECIES NAME		6. FAX (include area code)	FILING DATE Aug. 29, 1996
Triticum aestivum L.		573-882-0050	
8. FAMILY NAME (Botanical)		FILING AND EXAMINATION FEE	
Gramineae		\$2450.00	
9. CROP KIND NAME (Common name)		DATE August 29, 1996	
Wheat, Common		CERTIFICATION FEE	
10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name)		\$300.00	
Educational organization		DATE 11/8/99	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION		12. DATE OF INCORPORATION	
N/A			
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS		14. TELEPHONE (include area code)	
Dr. Anne L. McKendry Department of Agronomy 106 Curtis Hall University of Missouri Columbia, MO 65211		573-882-7708	
15. FAX (include area code)		573-884-7850	
16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)			
<input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Applicant's Ownership <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository) <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450), made payable to "Treasurer of the United States" (Mail to PVPO)			
17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act)			
<input checked="" type="checkbox"/> YES (If "yes," answer items 18 and 19 below) <input type="checkbox"/> NO (If "no," go to item 20)			
18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?		19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		<input checked="" type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED	
20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?			
<input type="checkbox"/> YES (If "yes," give names of countries and dates) <input checked="" type="checkbox"/> NO			
21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.			
The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.			
Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF APPLICANT (Owner(s))		SIGNATURE OF APPLICANT (Owner(s))	
			
NAME (Please print or type)		NAME (Please print or type)	
Jacquelyn K. Jones		Roger Zmihorski	
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
Director, Business Service			

## Ernie Soft Red Winter Wheat

### 16a. Exhibit A: Origin and Breeding History

'Ernie' soft red winter wheat (*Triticum aestivum* L.) (Reg. no. CV - 811, PI 584525) was developed by the Missouri Agricultural Experiment Station. Ernie originated from the cross Pike/MO9965 made in 1980. MO9965 is from the cross 'Stoddard'/'Blueboy'//Stoddard/D1707. D1707 is a two gene semidwarf line from India derived from CIMMYT germplasm. Ernie was tested as MO 12256.

In 1987, heads were taken from an F<sub>7</sub> bulk from the cross outlined above. Selection criteria included *Septoria tritici* blotch reaction, (caused by *Septoria tritici* Roberge in Desmaz.) early maturity, and short stature. F<sub>7</sub> derived F<sub>8</sub> head rows (5' in length, on 14" row spacing) were planted in the fall of 1987. Ernie was selected in 1988 as an F<sub>7</sub>-derived F<sub>8</sub> line. Selection criteria included moderate resistance to *Septoria tritici*, early maturity, short stature, high tillering capacity, good threshability (based on hand threshing 2-3 heads from the row), and large, well-formed kernels. Ernie was tested in preliminary yield testing in 1989 and 1990 and in advanced yield nurseries from 1991 through to its release in 1995. Selection criteria in preliminary and advanced nurseries included: winter hardiness, reduced height, early maturity, resistance to *Septoria tritici* blotch, moderate resistance to head scab, [caused by *Gibberella zeae* (Schweinitz) Petch; anamorph *Fusarium graminearum* Schwabe], test weight, resistance to lodging, milling and baking quality, and yield potential. Outside of the University of Missouri wheat breeding program, Ernie was tested in preliminary 4-State Cooperative Nursery (MO, IN, IL, OH) trials in 1991, in advanced 4-State Cooperative Nursery trials in 1992 and in the Uniform Eastern Soft Red Winter Wheat Cooperative Nursery in 1993 and 1994. It has also been tested in the Missouri Winter Wheat Performance Tests since 1992.

Purification was initiated in 1989 from a set of 6 heads taken from the 1988-grown F<sub>8</sub> line. These heads were individually threshed and planted as a six-row, 15-ft purification plot. To purify the line, 6 heads were taken from the purification plot of the previous season and planted as a six row plot. In all cases, middense, tip-awnletted, tapered, erect heads with yellow anthers were selected from short-statured green plants. Heads of Ernie routinely set 2 seeds/spikelet and this was used as an additional selection criteria during the purification process. This process was repeated each year from 1989 to 1992. In 1992/93, the purification plot was harvested using a Suzue binder to maintain purity, threshed through a Vogel thresher and planted as a purification drill strip.

Approximately 0.2% off-types were noted in the 1993/94 strip. Variants included taller awnletted plants with later maturity and awned plants. A set 6,000 heads (selected based on the criteria given above) were taken from the 1993/94 drill strip, individually threshed and planted as head rows to produce breeder's seed. Approximately 70-100 rows were removed because they were either variants described earlier (approximately 15 head rows) or were winter killed due to their position in a low spot in the field. The remaining head rows were combine harvested and grown as Foundation Seed in 1994/95. Foundation seed was rogued for variants and planted in 1996 as certified seed. The Missouri Certified Seed Organization inspected certified seed fields of Ernie (F<sub>16</sub>) generation and identified approximately 0.2% off-types of those two types listed above. Ernie was therefore uniform and stable in its variants for three generations, from 1994 through the 1996 crop season. In 1999, it continues to show approximately 0.2% variants in certified seed fields.

**Description of Experimental Conditions for Data Presented:**

Data presented are extracted from the 1993 Missouri Winter Wheat Performance Tests (Special reports 453 and 466 from the College of Agriculture, Food and Natural Resources Agricultural Experiment Station, University of Missouri, Columbia, MO 65211). The objective of these tests is to provide Missouri wheat growers with a reliable, unbiased, up-to-date source of information that will permit valid comparisons among improved wheat varieties from both the private (commercial) and public (university and USDA) sectors. Data presented are comparisons of Ernie with soft red winter wheat variety Clark to which it is most similar. Test mean and range are the mean and range of 64 soft red winter wheat entries in the test from which these data were extracted.

**Experimental Design and Seeding Methods:**

The 1992, 1993, and 1994 soft red winter wheat tests contained 64 entries in each year. Entries were arranged in an 8 x 8 lattice design with four replications. Test plots consisted of a 15 foot, 6-row plot with 7-inch row spacing. All entries were seeded at approximately 1.5 million seeds per acre. Actual seeding rates were calculated from the thousand kernel weights determined for each entry in each year. Seeding rates per plot were 1850 seeds for each variety. Seeding rates were not adjusted for germination.

All entries were sown on ground where the previous crop had been soybeans. Entries were seeded 1.25 to 1.5 inches deep into conventional seedbeds using a Hege plot drill equipped with double disk openers. Basic agronomic practices were used. Nitrogen was applied in a split fall/spring applications with spring applications generally being made after initial green up. Preplant phosphorous and potassium applications were based on soil test recommendations provided by the University of Missouri Soil Testing Laboratory located at Columbia, MO. Nitrogen applications were also in accordance with soil test recommendations for 100 bu wheat and are given, along with planting and harvesting dates, in Table 1.

**Statistical Analyses:**

Raw data were plotted using Excel and visually examined for normalcy. All data sets approximated a normal distribution and data were not transformed. Distributions for all data presented are given in Figures 1 through 5. Any small deviations from a normal distribution were rendered inconsequential by the robustness of the F-statistic. All data were analyzed as a four-replication, lattice design. The significance of genotypes was determined using the ANOVA F- statistic. Fisher's least significant difference at the 0.05 probability level [ $LSD_{(0.05)}$ ] and coefficients of variation percentages (CV%) were calculated from the analyses of variance for each location. Data for traits reported are given in Tables 1 - 3.

**Ernie Soft Red Winter Wheat****16b. Exhibit B: Novelty Statement**

Parentage: Ernie was derived from the cross Pike/MO 9965. Of its parents, Ernie combines the middense spike, square-shoulder glumes and reduced floret fertility of the MO 9965 with the tapered, awnleted, and acute beak spike characters of Pike. Ernie has the medium short stature and maturity of MO 9965. Resistance of Ernie to Septoria leaf blotch (caused by *Septoria tritici* Roberge ex Desmaz.) was tested in both greenhouse inoculated seedlings and adult plants grown in the field. Resistance level appears transgressive, combining genes from both parents. Its resistance to Septoria leaf blotch is moderate and superior to either parent. Supporting data attached in Tables 2a and 2b.

Ernie (MO 12256) has been tested in Missouri breeding trials since 1989. It most closely resembles the variety 'Clark'. Heading date for both is similar. Both have medium short stature although in some environments, height can differ by an inch. Paired comparisons presented in Table 3. Both varieties have a green plant color at the boot stage, have yellow anthers and awnleted spikes. Neither have a tendency to set more than 2 kernels across a spikelet. Both thresh easily and have a tendency to shatter. Kernel shape for both is ovate, kernel brush is medium and not collared and kernel size is large. Glumes of both are medium in length. Ernie differs most obviously from Clark in glume color at maturity. Ernie has white glumes while Clark has tan or brown glumes at maturity. Less obviously, the glumes of Clark are obtuse and those of Ernie are acute.

Table 1. Agronomic practices for plots used for trait comparisons of Ernie with its parents, Pike and MO 9965 and with Clark.

Treatment	1992		1993		1994	
	Columbia	Portageville	Columbia	Mt. Vernon	Columbia	Novelty
Planting date	10/9/91	10/22/91	10/1/1992	10/15/1992	10/08/1993	10/01/1993
Harvest date	06/29/92	06/16/92	06/30/1993	06/28/1993	06/29/1994	07/03/1994
Fall N (lb/acre)	32	40	40	40	40	40
Spring N (lb/acre)	80	80	80	80	80	80
Total N (lb/acre)	112	120	120	120	120	120

9600360

Table 2a. Comparison of Ernie with MO 9965 and Pike for response to *Septoria tritici*. Field data are from Columbia, MO during the 1993 crop year. Greenhouse data reflect artificial inoculation of a randomized complete block design replicated 4 times and grown in the glasshouse at Columbia in 1992.

Variety	Septoria tritici blotch rating	
	Field 1993 <sup>1</sup>	Greenhouse <sup>2</sup>
Ernie	23	1.7
MO 9965	43	4.4
Pike	49	4.9
Mean	39	4.0
LSD <sub>(0.05)</sub>	10.1	2.5
CV (%)	18.4	44.0
Range	23-61	0.2-8.6
F statistic	10.82	4.88
Probability	0.0001	0.0001

<sup>1</sup> Data reflect the percent of the canopy with *Septoria tritici* blotch. Plots were evaluated during the milk stage of kernel development (Feekes 11.1).

<sup>2</sup> Necrosis ratings of wheat seedlings inoculated at the two leaf stage under greenhouse conditions with a conidial suspension of *Septoria tritici*. Leaf ratings were done 3 weeks after infection and were done on a 0-9 scale where 0=no infection and 9=complete necrosis of the inoculated leaf.

Table 2b. Comparison of Ernie with MO 9965 and Pike for height, and heading date for tests grown at Missouri locations in 1992 and 1993.

[illegible]

## PVP Application - Ernie Soft Red Winter Wheat: Exhibit B

Table 3. Comparison of height and days to heading of Ernie with Clark grown at Missouri locations in 1993 and 1994.

Variety	1993				1994			
	Columbia, MO		Mt. Vernon, MO		Columbia, MO		Novelty, MO	
	Height <sup>1</sup> (in)	Heading date <sup>2</sup> (julian)	Height (in)	Heading date (julian)	Height (in)	Heading date (julian)	Height (in)	Heading date (julian)
Ernie	35	134	35	132	37	134	38	138
Clark	36	134	35	133	39	133	41	138
Test mean	38	137	37	135	39	137	40	141
LSD <sub>(0.05)</sub>	1.4	0.7	1.8	1.0	1.3	1.0	1.3	0.8
CV(%)	2.6	0.4	3.5	0.5	2.5	0.5	2.4	0.4
Range	32-41	134-141	33-40	129-141	33-45	133-140	34-46	137-144
F-statistic	15.31	38.67	6.26	47.03	25.94	28.28	24.36	30.82
Probability	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

<sup>1</sup> Plant height in a plot was taken as the mean of three measurements (in inches) from the soil surface to the top of the head, excluding awns if present. Reported values have been rounded to the nearest inch.

<sup>2</sup> Heading date was recorded when 50% of the heads in a plot had extended above the flag leaf collar. Heading dates were recorded in Julian days (number of days from January 1).

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE DIVISION  
BELTSVILLE, MARYLAND 20705

EXHIBIT  
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY  
WHEAT (*Triticum* spp.)

NAME OF APPLICANT(S) The Curators of the University of Missouri	FOR OFFICIAL USE ONLY
ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) University of Missouri 321 University Hall Columbia, MO 65211	PVPO NUMBER 9600360
	VARIETY NAME Ernie
	TEMPORARY OR EXPERIMENTAL DESIGNATION MO. 12256

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g.    or   ) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used: \_\_\_\_\_

Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

1

1=Common

2=Durum

3=Club

4=Other (SPECIFY) \_\_\_\_\_

2. VERNALIZATION:

2

1=Spring

2=Winter

3=Other (SPECIFY) \_\_\_\_\_

3. COLEOPTILE ANTHOCYANIN:

1

1=Absent

2=Present

4. JUVENILE PLANT GROWTH:

2

1=Prostrate

2=Semi-erect

3=Erect

5. PLANT COLOR (boot stage):

2

1 = Yellow-Green

2 = Green

3 = Blue-Green

6. FLAG LEAF (boot stage):

2

1 = Erect

2 = Recurved

1

1 = Not Twisted

2 = Twisted

7. EAR EMERGENCE:

0  4

Number of Days Earlier Than Wakefield

0  0

Number of Days Later Than Clark

8. ANTHR COLOR:

1

1 = YELLOW

2 = PURPLE

9. PLANT HEIGHT (from soil to top of head, excluding awns):

cm Taller Than

1  2

cm Shorter Than

Wakefield

## 10. STEM:

## A. ANTHOCYANIN

☐ 1 = Absent      2 = Present

## B. WAXY BLOOM

☐ 1 = Absent      2 = Present

## C. HAIRINESS (last internode of rachis)

☐ 1 = Absent      2 = Present

D. INTERNODE (SPECIFY NUMBER) 4 nodes above the ground

☐ 1 = Hollow      2 = Semi-solid      3 = Solid

## E. PEDUNCLE

☐ 2 = 1 = Absent      2 = Present

☐ 16 cm Length

## 11. HEAD (at Maturity):

## A. DENSITY

☐ 2 = 1 = Lax      2 = Middense      3 = Dense

## B. SHAPE

☐ 1 = 1 = Tapering      2 = Strap      3 = Clavate      4 = Other (SPECIFY) \_\_\_\_\_

## C. CURVATURE

☐ 2 = 1 = Erect      2 = Inclined      3 = Recurved

## D. AWNEDNESS

☐ 3 = 1 = Awnless      2 = Apically Awnletted      3 = Awnletted      4 = Awned

## 12. GLUMES (at Maturity):

## A. COLOR

☐ 1 = 1 = White      2 = Tan      3 = Other (SPECIFY) \_\_\_\_\_

## B. SHOULDER

☐ 4 = 1 = Wanting      2 = Oblique      3 = Rounded      4 = Square      5 = Elevated      6 = Apiculate

## C. BEAK

☐ 2 = 1 = Obtuse      2 = Acute      3 = Acuminate

## D. LENGTH

☐ 2 = 1 = Short (ca. 7mm)      2 = Medium (ca. 8mm)      3 = Long (ca. 9mm)

## E. WIDTH

☐ 2 = 1 = Narrow (ca. 3mm)      2 = Medium (ca. 3.5mm)      3 = Wide (ca. 4mm)

## 13. SEED:

## A. SHAPE

☐ 1 = 1 = Ovate      2 = Oval      3 = Elliptical

## B. CHEEK

☐ 1 = 1 = Rounded      2 = Angular

## C. BRUSH

☐ 2 = 1 = Short      2 = Medium      3 = Long

☐ 1 = 1 = Not Collared      2 = Collared

## D. CREASE

☐ 1 = 1 = Width 60% or less of Kernel  
2 = Width 80% or less of Kernel  
3 = Width Nearly as Wide as Kernel

☐ 1 = 1 = Depth 20% or less of Kernel  
2 = Depth 35% or less of Kernel  
3 = Depth 50% or less of Kernel

## 13. SEED: (continued)

## E. COLOR

1 = White    2 = Amber    3 = Red    4 = Other (SPECIFY) \_\_\_\_\_

## F. TEXTURE

1=Hard    2=Soft

## G. PHENOL REACTION (see instructions):

1 = Ivory    2 = Fawn    3 = Light Brown    4 = Dark Brown    5 = Black

14. DISEASE: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)  
PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

Stem Rust (*Puccinia graminis* f. sp. *tritici*)

Snr6, Sr 36

Stripe Rust (*Puccinia striiformis*)
Tan Spot (*Pyrenophora tritici-repentis*)
Halo Spot (*Selenophoma donacis*)

## Septoria nodorum (Glume Blotch)

## Septoria avenae (Speckled Leaf Disease)

## Septoria tritici (Speckled Leaf Blotch)

Scab (*Fusarium* spp.)

See Exhibit D

## "Black Point" (Kernel Smudge)

## Barley Yellow Dwarf Virus (BYDV)

## Soilborne Mosaic Virus (SBMV)

## Wheat Yellow (Spindle Streak) Mosaic Virus

## Wheat Streak Mosaic Virus (WSMV)

## Other (SPECIFY) \_\_\_\_\_

## Other (SPECIFY) \_\_\_\_\_

## Other (SPECIFY) \_\_\_\_\_

Leaf Rust (*Puccinia recondita* f. sp. *tritici*)
Loose Smut (*Ustilago tritici*)
Flag Smut (*Urocystis agropyri*)
Common Bunt (*Tilletia tritici* or *T. laevis*)
Dwarf Bunt (*Tilletia controversa*)
Karnal Bunt (*Tilletia indica*)
Powdery Mildew (*Erysiphe graminis* f. sp. *tritici*)

## "Snow Molds"

Common Root Rot (*Fusarium*, *Cochliobolus* and *Bipolaris* spp.)
Rhizoctonia Root Rot (*Rhizoctonia solani*)
Black Chaff (*Xanthomonas campestris* pv. *translucens*)
Bacterial Leaf Blight (*Pseudomonas syringae* pv. *syringae*)

## Other (SPECIFY) \_\_\_\_\_

## Other (SPECIFY) \_\_\_\_\_

## Other (SPECIFY) \_\_\_\_\_

## Other (SPECIFY) \_\_\_\_\_

15. INSECT: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

9600360  
Exhibit C (Wheat) Pa

PLEASE SPECIFY BIOTYPE (where needed)

Hessian Fly (*Mayetiola destructor*)

☒ 1

Other (SPECIFY) \_\_\_\_\_

☐

Stem Sawfly (*Cephus* spp.)

☐ 0

Other (SPECIFY) \_\_\_\_\_

☐

Cereal Leaf Beetle (*Oulema melanopa*)

☒ 1

Other (SPECIFY) \_\_\_\_\_

☐

Russian Aphid (*Diuraphis noxia*)

☐ 0

Other (SPECIFY) \_\_\_\_\_

☐

Greenbug (*Schizaphis graminum*)

☐ 0

Other (SPECIFY) \_\_\_\_\_

☐

Aphids

☐ 0

Other (SPECIFY) \_\_\_\_\_

☐

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS:

96 AUG 29 19:59

USDA-AMS-PVPO

RECEIVED

OFFICE

☐

## Ernie Soft Red Winter Wheat

### 16d. Exhibit D: Additional Description of Ernie

Ernie has very good milling and baking quality based on 1989 to 1995 crop evaluations conducted at the USDA-ARS Soft Wheat Quality Laboratory in Wooster, OH. The overall milling quality score for Ernie is similar to Caldwell and Cardinal. The overall baking quality score for Ernie is similar to Caldwell and superior to Cardinal. See Exhibit D, Tables 1 and 2.

Ernie has some Type II resistance to scab (caused by *Gibberella zeae* (Schweinitz) Petch anamorph: *Fusarium graminearum* Schwabe.) with a reaction similar to 'Freedom'. Type II reactions (infected spikelets/total spikelets \* 100) indicate that disease does not spread in the head beyond adjacent spikelets. This reaction is rare in wheat. Data are presented in Exhibit D, Table 3. Since the initial application, the Eastern Wheat Workers have initiated a soft red winter wheat scab nursery. Appended in Exhibit D, Table 4, are data from the initial nursery, reported from 9 locations in the in eastern United States. The more recent data from this nursery, suggests that Ernie has a better Type II reaction (FHB Index) than Freedom. These data further indicate Ernie's distinctiveness. The complete summary data table from that nursery is also appended.

Table 1. Composite scores for both milling and baking quality for Ernie compared to check cultivars over years at Missouri test sites. Data were provided by the USDA-ARS Soft Wheat Quality Laboratory, Wooster, OH.

Variety	1989		1990		1991		1992							
	Columbia		Columbia		Portageville		Grundy Co.		Mt. Vernon		Columbia		Portageville	
	Mill <sup>1</sup>	Bake <sup>2</sup>	Mill	Bake	Mill	Bake	Mill	Bake	Mill	Bake	Mill	Bake	Mill	Bake
Ernie	107.3	110.0	100.5	96.1	105.5	100.1	103.2	83.0	92.5	102.8	98.0	97.0	96.5	98.7
Caldwell	100.0	100.0	100.0	100.0	100.0	100.0	102.7	89.7	95.2	93.4	100.0	100.0	100.0	100.0
Cardinal			105.1	88.9	106.7	91.4	104.6	80.6	98.0	96.2	103.8	86.7	104.3	92.1
Pioneer 2555			104.9	110.0	110.0	101.2	100.0	100.0	100.0	100.0	107.2	102.1	101.2	104.9
Pioneer 2548							92.8	72.6	92.4	80.1	97.6	88.4	94.6	98.4
Wakefield											101.8	92.1	102.6	96.6

<sup>1</sup> Milling quality score = weighted average of adjusted flour yield (50%), softness equivalent (30%), test weight (10%) and ash content (10%) expressed as the deviation (percentage units) from the nursery standard, Caldwell.

<sup>2</sup> Baking quality score = a weighted composite score of alkaline water retention capacity (50%) and softness equivalent (50%) expressed as the deviation (percentage units) from the nursery standard, Caldwell.

Composite scores for both milling and baking quality are in accordance with standard microtest procedures of the USDA-ARS Soft Wheat Quality Laboratory, Wooster, Ohio.

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Table 2. Milling and baking letter grade scores for Ernie, and check varieties compared to check cultivars over years at Missouri test sites . Data were provided by the USDA-ARS Soft Wheat Quality Laboratory, Wooster, OH.

Variety	1989		1990		1991		1992				
	<u>Columbia</u>	<u>Columbia</u>	<u>Portageville</u>	<u>Grundy Co.</u>	<u>Mt. Vernon</u>	<u>Columbia</u>	<u>Portageville</u>				
	Mill <sup>1</sup>	Bake <sup>2</sup>	Mill	Bake	Mill	Bake	Mill	Bake			
Ernie	A <sup>3</sup>	A	A	B	A	A	E	C	A	B	B
Caldwell	A	A	A	A	A	A	D	B	C	A	A
Cardinal			A	D	A	C	A	E	B	B	A
Pioneer 2555			A	A	A	A	A	A	A	A	A
Pioneer 2548						C	F	C	E	B	D
Wakefield										A	C

<sup>1</sup> Milling quality score = weighted average of adjusted flour yield (50%), softness equivalent (30%), test weight (10%) and ash content (10%).<sup>2</sup> Baking quality score = a weighted composite score of alkaline water retention capacity (50%) and softness equivalent (50%)<sup>3</sup> Letter grade differences in accordance with standard procedures at the USDA-ARS Soft Wheat Quality Laboratory, Wooster, OH.

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Table 3. Type II *Fusarium* head blight (FHB) reactions for Ernie, compared to nursery check varieties, Columbia, MO 1993.

Variety	Type II scab reaction <sup>1</sup>
Ernie	17
Freedom	12
Caldwell	25
Dynasty	44
Pioneer 2548	28
Wakefield	36
Test Mean	32
LSD <sub>(0.05)</sub>	24
CV%	49%
Range	12 - 64
F test	2.31
Probability	0.001

<sup>1</sup> Percent infected spikelets at maturity following inoculation at anthesis (Feeke's GS 10.51) of a single spikelet with *Fusarium graminearum*.

Table 4.

Fusarium head blight (FHB) resistance reactions of Ernie compared to released cultivars, tested across locations in the Eastern United States. Data reported in the 1998 Uniform Winter Wheat Fusarium head Blight Screening Nursery Report, compiled by Kim Campbell (Agronomist) and Barb Franchino (Statistician), O.A.R.D.C., Ohio State University.

Variety	FHB Incidence (%)	FHB Severity (%)	FHB Index (0-100)	Kernel Rating (0-100)	Tombstones (%)	Vomitoxin (ppm)
Ernie	48.5	26.0	13.0	31.5	14.5	9.1
Patterson	59.5	54.3	36.2	31.5	28.5	10.0
Freedom	58.0	39.9	25.3	49.4	65.5	8.0
Pioneer 2545	59.5	54.6	37.8	53.2	70.0	9.8
Wakefield	61.2	48.9	35.3	44.6	54.5	8.4
Foster	57.3	51.4	34.0	44.3	49.5	8.0
Locations	11	9	9	5	2	2
F-value	3.4	5.1	4.7	2.6	2.2	1.7
P-value	0.0001	0.0001	0.0001	0.0001	0.0154	0.0705

## Means Across Locations\*

	Heading Date ** (Julian)	rank	FHB Incidence (%)	FHB Severity (%)	FHB Index (0-100)	Kernel Rating (0-100)	Tomb- stones (%)	Yield (kg/ha)	Vomitoxin (ppm)							
1 Patterson	130.9	3	59.5	27	54.3	26	36.2	25	31.5	2	28.5	6	2416	5	10.0	29
2 Freedom	135.1	24	58.0	22	39.9	13	25.3	14	49.4	28	65.5	32	2094	11	8.0	18
3 P2545	135.5	25	59.5	26	54.6	27	37.8	27	53.2	30	70.0	33	2033	14	9.8	28
4 Ernie	130.4	1	48.5	4	26.0	1	13.0	1	31.5	3	14.5	1	2509	4	9.1	24
5 M94-1048	131.1	6	53.4	9	36.4	11	18.2	5	40.6	13	33.5	9	2926	2	8.7	23
6 OH618	131.0	5	45.1	1	28.9	3	15.0	2	36.1	9	35.0	12	3118	1	5.7	8
7 OH552	132.1	13	56.2	14	28.1	2	17.8	4	44.7	21	31.5	8	2699	3	6.5	10
8 OH536	136.9	29	68.9	32	46.5	20	36.4	26	54.1	31	60.5	30	1789	19	9.4	26
9 OH544	138.8	31	55.8	12	43.3	18	31.9	19	46.9	27	48.0	23	1587	27	9.4	26
10 Wakefield	134.9	22	61.2	29	48.9	23	35.3	23	44.6	20	54.5	27	1997	16	8.4	21
11 VA96-54-216	131.4	7	72.0	33	57.6	31	45.2	33	55.5	33	51.0	25	1754	20	11.1	31
12 VA93-54-429	131.8	11	62.3	30	35.4	10	23.1	11	35.3	8	27.5	4	2041	13	11.6	32
13 VA96-54-234	131.0	4	67.3	31	48.1	22	35.7	24	46.1	26	36.5	14	2147	10	14.2	33
14 IL94-1909	134.3	18	57.2	19	33.9	8	24.0	13	31.6	4	47.0	22	2396	6	6.8	13
15 IL94-1549	134.6	20	51.5	6	32.7	6	21.4	9	42.1	16	43.0	20	1734	22	5.7	7
16 92823A1-1-4-4-5	132.0	12	46.7	3	40.1	15	21.1	8	34.3	7	30.0	7	2323	7	5.0	4
17 92807A1-1-5-1-1	130.7	2	56.1	13	43.0	17	27.4	17	37.3	10	28.0	5	2153	9	6.7	12
18 89118RC1-X-9-3-3	133.2	14	50.4	5	32.2	5	15.1	3	33.5	5	36.5	14	2258	8	6.3	9
19 86958RC4-2-1-10	131.6	8	57.0	17	46.0	19	29.1	18	41.7	14	41.0	16	2013	15	5.6	6
20 88288C1-6-2-8	134.4	19	53.6	10	42.8	16	26.6	15	43.5	18	46.5	21	1588	26	4.4	3
21 92829A1-1-1-3-3	131.7	9	45.9	2	30.8	4	19.1	6	24.5	1	16.5	2	2050	12	3.1	1
22 KS85W663-11-6-42	133.9	16	52.2	7	33.1	7	20.6	7	40.2	12	35.0	12	1814	17	9.5	27
23 Geneva	134.6	21	57.3	20	58.9	33	38.2	28	45.7	24	65.0	31	1355	32	6.9	14
24 Cayuga	136.4	28	56.5	15	57.9	32	38.3	29	38.8	11	39.0	16	1292	33	7.3	15
25 NY85019-7117	134.1	17	57.0	18	56.3	29	38.7	30	45.0	22	60.0	29	1731	23	7.3	16
26 NY87048W-7387	135.8	26	52.4	8	35.1	9	22.9	10	34.0	6	25.5	3	1395	31	5.0	5
27 NY87047W-7405	131.8	10	60.6	28	50.1	24	32.6	20	46.0	25	37.0	15	1445	30	8.0	19
28 NY64H/H-7133	135.9	27	59.1	25	56.3	28	40.2	31	45.1	23	54.5	27	1492	29	9.4	26
29 Foster	133.6	15	57.3	21	51.4	25	34.0	21	44.3	19	49.5	24	1507	28	8.0	18
30 D5330	137.9	30	55.3	11	36.8	12	23.6	12	42.1	15	34.5	10	1743	21	6.6	11
31 D4045	135.0	23	58.5	24	56.3	30	40.3	32	51.5	29	55.0	28	1632	24	11.0	30
32 DC005	139.8	33	58.0	23	47.6	21	34.4	22	43.4	17	40.5	17	1616	25	8.2	20
33 Ramrod	138.8	32	56.8	16	40.0	14	26.6	16	54.4	32	42.0	19	1806	18	8.7	23
Number of locations with data																
	5		11	9	9	5	3	3	3							

Number of locations  
with data

5

11

9

9

5

2

2

2

\* See tables for individual traits for notes on where data have been converted to be standardized across locations.  
 \*\* Heading Date excludes South Dakota data.

### Results from Analyses of Variance\*

Entrées		Locations	
df	32	df	4
Mean Square	32.0	Mean Square	385.9
F-value	6.4	F-value	76.9
P-value	0.0001	P-value	0.0001

Entrées		Locations	
df	32	df	10
Mean Square	364.3	Mean Square	36869.3
F-value	3.4	F-value	340.0
P-value	0.0001	P-value	0.0001

Entrées		Locations	
df	32	df	8
Mean Square	904.5	Mean Square	10194.4
F-value	5.1	F-value	57.6
P-value	0.0001	P-value	0.0001

Entrées		Locations	
df	32	df	8
Mean Square	695.2	Mean Square	17001.9
F-value	4.7	F-value	114.9
P-value	0.0001	P-value	0.0001

Entrées		Locations	
df	32	df	4
Mean Square	242.7	Mean Square	43505.0
F-value	2.6	F-value	469.9
P-value	0.0001	P-value	0.0001

Entrées		Locations	
df	32	df	1
Mean Square	379.9	Mean Square	16356.4
F-value	2.2	F-value	93.9
P-value	0.0154	P-value	0.0001

Entrées		Locations	
df	32	df	1
Mean Square	402753.7	Mean Square	4820201.1
F-value	2.5	F-value	30.2
P-value	0.8054	P-value	0.0001

Entrées		Locations	
df	32	df	1
Mean Square	101.7	Mean Square	44.3
F-value	1.7	F-value	7.1
P-value	0.0705	P-value	0.0124

\* See tables for individual traits for notes on where data have been converted to be standardized across locations.

<sup>\*\*</sup> Heading Date excludes South Dakota data.

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

EXHIBIT E  
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) The Curators of the University of Missouri		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER MO 12256	3. VARIETY NAME Ernie
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) University of Missouri 321 University Hall Columbia, MO 65211		5. TELEPHONE (include area code) 573-882-3211	6. FAX (include area code) 573-882-0050
		7. PVPO NUMBER 9600360	
8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain. <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
9. Is the applicant (individual or company) a U.S. national or U.S. based company? If no, give name of country <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
10. Is the applicant the original breeder? If no, please answer the following: a. If original rights to variety were owned by individual(s): Is (are) the original breeder(s) a U.S. national(s)? If no, give name of country <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO b. If original rights to variety were owned by a company: Is the original breeder(s) U.S. based company? If no, give name of country <input type="checkbox"/> YES <input type="checkbox"/> NO			
11. Additional explanation on ownership (If needed, use reverse for extra space):			

## PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original breeder, both the original breeder and the applicant must meet one of the above criteria.

The original breeder may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

Public reporting burden for this collection of information is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Officer, OIRM, AG Box 7630, Jamie L. Whitten Building, Washington, D.C. 20250. When replying, refer to OMB No. 0581-0055 and form number in your letter.

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